

ILRS Prediction and Data Formats Update, version 2

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For the ILRS Format Change Study Group

Need for Changes

- New missions with new requirements
- Expanded configuration information
- Correct oversights in original formats
- Debris tracking – avoid multiple format branches
- Updates to manuals
- Fortunately, formats were designed to be flexible and expandable

Consolidated Prediction Format (CPF)

- ELT mission:
 - Transponder Clock Reference Time (in H4 record)
 - Ephemeris Sequence number (in filename and H1 record)
 - Had 4 digits: 3 related to day of year; 1 for sequence in day
 - New mission needs more than 10 updates/day, due to drag on ISS
 - Now 3 digits for day, 1 character (1-9, a-z) for sub-daily

CPF, continued

- Make headers (H1-Hn) free format like rest of records. More flexible in the long run. Not backwards compatible.
- Break Target Type (H2) into 2 fields:
 - Type of reflector (including “none”); and
 - Locations (earth orbit, moon, moon orbit, etc.)
 - Not backwards compatible
- Rewrite manual to free it from TIV heritage
- To start, only those producing and using predictions for the ELT mission will need to convert

Consolidated Data Format (CRD)

- Add more configuration information
 - Software (C5)
 - Meteorological Sensors (C6)
- Day wrap-around issue (agreed to in Annapolis)
- Lunar processing (using comment records is OK)
- Make headers (H1-Hn) free format like rest of records. Not backwards compatible.
- Break Target Type (H2) into 2 fields (as with CPF)
- Break return rate and signal:noise ratio separate fields (11)
- Add appendix with expected field values

CRD – Debris Tracking Changes

- Debris tracking
 - Add possibility of debris-only subnetworks (H2 and file name)
 - Make station and satellite info wording more general (H2, H3)
 - Allow for debris tracking in target description (H3)
 - Add “visual” as data type (H4)
 - Add prediction file name (CPF or TLE) (H5)
 - Add camera configuration record (C7)
 - Add range and az/el rates (12, and 30)

CPF Implementation Schedule

- Riga: Updated manual and format
- End of 2017: Update manual and format based on decisions in Riga, for January 2018 distribution
- April 2018: Complete and distribute sample code
- July 2018: Implemented at ELT prediction provider and observing stations
- Canberra Workshop, Fall 2018: Finish and recap

CRD Implementation Schedule

- Riga: Updated manual and format
- End of 2017: Update manual and format based on decisions in Riga, for January 2018 distribution
- April 2018: Complete and distribute sample code
- July 2018: Implemented at OCs
- Canberra Workshop, Fall 2018: Implemented at ACs and some stations
- All stations implement by Fall 2019

Implementation Notes

- CPF providers cannot distribute data in revised format until all stations are able to read it. May require 2 format versions being available at once
- OCs and ACs will need to be able to accept data in format versions 1 and 2 for an indefinite period of time

Site Log Revisions

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For ILRS CB, DFPSC, NESC

Site Log Change Process

- Initiated by ILRS Central Bureau (CB)
- Affects formats and networks, so Data Formats and Procedures SC and Networks and Engineering SC need to be involved
- Logistically, decisions need to be made in this meeting of DF&PSC. This is to prevent merging of decisions and changes from 2 different SCs!

Site Log Changes - I

- Section 2- added survey method
- Section 4- telescope info has start and end dates, and FOV question was added.
- Section 5- added more laser and beam divergence info
- Section 7- added restricted tracking information

Site Log Changes - II

- Section 8- more information on ground targets and system calibration.
- Section 12- SRP distance was added
- Section 13- added level to site tie numbering so that old site ties remain in file
- Section 15- added website
- All- corrected or updated wording

Software Re-use Study Group

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UT Lunar Software

MLRS Lunar prediction and filtering software has been open-sourced with NASA's permission, and is on the ILRS website

This package includes descriptions of the programs and how to integrate JPL-owned software and ephemeris.

Also included is the LLR/SLR-capable Poisson filtering program using CRD input and output

Herstmonceaux Normal Point Program

Matt Wilkinson reports:

- Hx normal point processor converted to Python
- Will be released as open source, as early as the end of 2017
- Needs volunteers to help test and provide feedback
- Calibration and other post-processing not in code

CPF/CRD sample code

These code sets will be updated for the new format around April 2018

Lunar 'c' sample CPF code has been modified, thanks to the prodding from one of our French colleagues. There were some coding that stricter 'c' compilers could not handle. This will be replace existing code on the ILRS web site soon.

Anything Else?

Does anyone have code to open source?

Is anyone looking for a particular piece of software?